

PEM Stack Durability (New FY 2004 Project)

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Objectives

- Develop a detailed understanding of the membrane electrode assembly (MEA) failure process
- Develop perfluorosulfonic acid (PFSA) membranes with extended lifetimes
- Model membrane failure modes
- Perform extended stack tests with the optimized membranes and characterize structure and degradation mechanisms
- Elucidate failure mechanisms and develop technologies to meet the design lifetime target of proton exchange membrane (PEM) fuel cells (40,000 hours operation with <10% degradation in performance for stationary applications in 2010)
- Perform research, development and demonstration of membrane/catalyst systems that address transportation and/or stationary applications

Technical Barriers

This project addresses the following technical barriers from the Fuel Cells section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year R,D&D Plan:

- E. Durability
- O. Stack Material and Manufacturing Cost

Approach

Proton exchange membrane fuel cell companies need a more durable, longer-lived, cost effective membrane technology. PEM systems based on PFSA membranes are better understood than their high temperature counterparts. This project focuses on risk reduction of previously identified PFSA membrane degradation mechanisms and validation of promising mitigation strategies.

DuPont has enlisted the unique experience and capabilities of the University of Connecticut and the

University of Southern Mississippi to realize our goals. Our combined extensive experience, understanding of degradation mechanisms and proprietary membrane stabilization technology will provide a significant improvement in PFSA membranes that will achieve the DOE 2010 stack durability target of 40,000 hours for stationary fuel cells.

DuPont Fuel Cells, in partnership with United Technologies, will deliver a fuel cell system with a 40,000 hour PEM stack at an affordable price at the conclusion of this three-year project.